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UNITED STATES NAVY

MEDICAL NEWS LETTER

Vol. 44 Friday, 21 August 1964 No. 4

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014, giving full name, rank, corps, and old and new addresses.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

FEATURE ARTICLE

Laboratory Diagnosis of Intestinal Malabsorption Syndrome

LT Donald O. Castell MC USN* and LT Larry G. Dickson MC USN**.
U. S. Naval Medical Laboratory Quarterly 2(2): 11-15, April 1964.

In a previous issue of the Quarterly, a method for the examination of "capsule biopsies" of the alimentary canal was presented. Laboratory aids in the diagnosis of various malabsorption syndromes of the small and large intestine are not limited to describing such small specimens. Several clinical pathologic studies also aid in establishing such diagnoses.

Passage of nutrients across the interface of the intestinal mucosa depends upon two basic physiologic processes: (1) Digestion and (2) absorption. If digestive hydrolysis is faulty, ingested complex compounds are presented to the above interface in a state unsuitable for satisfactory absorption. A commonly cited abnormality of this nature occurs with deficiency of formation or flow of pancreatic juice. Absorption may be abnormal if the intestinal mucosa at the proper level is diseased or functionally absent. Functional or anatomic absence may result from surgical removal, surgically created by-pass flow of intestinal contents, or spontaneously occurring blind pouches or fistulas of congenital or inflammatory origin.

Clinical laboratory studies used in this field fall into the following major groups:

1. Tolerance studies-producing a "flat curve" if absorption is diminished.
2. Quantitative fecal determinations of dietary constituents.
3. Radioactive isotopic tracer studies with determination of
   a. Fecal excretion
   b. Absorbed level in blood
   c. Urinary excretion levels and/or rates

In each instance it must be emphasized that both the "raw product" food-stuff product and the pre-hydrolyzed product may be administered with benefit. Isolated abnormal absorption of the un-hydrolyzed food suggests the basic defect is one of the digestive phase; diminished absorption of the pre-digested food suggests absorption as the phase which is abnormal.

Steatorrhea is possibly the most common manifestation of malabsorption which brings a patient to the care of a physician. A simple reliable screening test for abnormal fecal fat excretion is available and has proven to be reliable in diagnosing steatorrhea and in following patient response to therapy:

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* Senior Resident in Internal Medicine, U. S. Naval Hospital, Bethesda, Md.
** Fourth Year Resident in Pathology, U. S. Naval Medical School, NNMC, Bethesda, Md.

Principle: Fecal fat is stained with ethanolic Sudan IV

Method:

a. On two numbered (1 and 2) glass slides place 0.5 cc of patient's stool.
b. Slide 1:
   1. Add 2 drops of water and thoroughly mix with specimen
   2. Add 2 drops of 95% ethanol and mix
   3. Add 2-3 drops of a saturated solution of Sudan IV in ethanol
   4. Mix and cover with cover slip
   5. Examine the slide under "high-dry" magnification paying special attention to the edges of the smear
c. Slide 2:
   1. Add 2-3 drops of 35% acetic acid and mix thoroughly
   2. Add 2-3 drops of the Sudan IV solution used above, mix and cover with cover slip.
   3. Heat slowly until the mixture starts to boil then allow to cool briefly
   4. Repeat step (3) twice more
   5. Examine while still warm, using the method described above

Results:

a. Slide number 1: If present, neutral fat will appear on this slide as yellow or pale-orange refractile globules. In normal patients few if any small globules will appear.
b. Slide number 2: Stained fatty acids appear as globules when warm. As the preparation cools, similarly stained spicules and amorphous masses of fatty acid crystals form.

Interpretation:

An experienced examiner is required;however;such facility is rapidly gained:

a. Normal: 0-100 tiny globules per field (1-4 u diameter)
b. Abnormal:
   1. Minimal-moderate: 40-500 globules measuring 10-50 u in diameter
   2. Marked: many fields packed with globules measuring 10-75 u in diameter.

Clinical Significance:

a. Increased neutral fat:(Slide 1 positive) - generally decreased digestion due to pancreatic disease with decreased exocrine function
b. Increased fatty acids:(Slide 2 positive) - digestion normal but steatorrhea due to faulty absorption

The above determination is performed with the patient ingesting a normal diet.

Other clinical laboratory studies which are useful in diagnosing malabsorption with steatorrhea include the following:

1. Standard quantitative determination of fecal fat. The method presented in the Biochemistry Manual, U. S. Naval Medical School, 1959, pp 171-174 is desirable because it is a "percentage-dry weight" method. (Normal: 5.8-25.6% dry weight).

2. I^{131} labeled lipid (labeled triolein or oleic acid) with determination of residual activity in the stool or blood activity at a given time following oral administration.
3. Serum carotene. This is proportional to the absorption of the fat soluble Vitamin A. The alcohol/ether extraction spectrophotometric method is good (Clinical Laboratory Diagnosis, Levinson, S. A. and MacFate, R. P., Lea and Febiger, Philadelphia, 1961, pp 379-380). (Normal: 70-250 micrograms per deciliter plasma or serum). Blood carotene is lowest in primary malabsorption and will return quickly to normal when treatment is successful. High fever, hepatic failure and dietary deprivation will also decrease the level. High levels are encountered in Vitamin A intoxication (as following ingestion of polar bear liver), carotenemia, hypothyroidism, diabetes and with any cause of hyperlipemia.
4. Serum cholesterol
5. Serum calcium (reflecting Vitamin D absorption)
6. Prothrombin time (reflecting Vitamin K absorption)

Substances other than lipids are also abnormally absorbed in malabsorption syndromes. Protein may be incompletely absorbed as part of a malabsorption syndrome or, in the "exudative enteropathies" such as regional enteritis, protein may be lost from the blood stream into the intestinal lumen. Such determinations include:

1. Serum protein (electrophoresis preferred)
2. Stool protein
3. Intravenous administration of I^{131}-polyvinyl-pyrrolidone (PVP) or Cr^{51}-albumin. The stool is monitored for radioactivity. Increased appearance of the label in the stool generally indicates an exudative process in the absence of significant gastrointestinal hemorrhage.

Similarly, carbohydrate digestion and absorption may be evaluated by the following laboratory methods:

1. D-xylose tolerance test: Xylose is a pentose which follows the absorption pathways of glucose. It is, however, metabolically inert and appears in the urine in amounts equal to those absorbed. The patient is given a "loading dose" and the urinary excretion is followed. The spectrophotometric method of Roe and Rice (J Biol Chem 173: 507, 1948) is convenient and satisfactory. When a 250 Gm dose is given to an adult (or 0.50 Gm/pound in children) 0.5 Gm/pound or more should be excreted after five hours. Less than 2.5 Gm indicates severe malabsorption.
2. Glucose tolerance test: when absorption is decreased, the curve will be "low and flat."
3. Starch tolerance test: when the above are normal and carbohydrate malabsorption is still suspected, ingestion of starch will cause a blood glucose rise similar to (2) above in the normal; if carbohydrate digestion is faulty,

the blood glucose will rise only slightly and return to base-line levels more rapidly than normal. Patients do not generally like the taste of starch.

Miscellaneous tests which may be indicated include:

1. Stool examination for ova, parasites and blood
2. Urinary 5-hydroxy-indol acetic acid (5-HIAA). Argentaffine cells are more numerous in sprue, celiac disease, regional enteritis, Whipple's disease, Menetrier's disease and other chronic inflammations of the Argentaffine cells and the coupled local hyperemia, the serum and urinary levels of 5-HIAA are increased.
3. Barium enema and small bowel series
4. Hemogram with or without bone marrow examination
5. FIGLU determination
6. Schilling test

Whenever a large battery of tests may be indicated for a given patient one may assume that the clinical picture of intestinal malabsorption may be caused by many disease entities. The following is a collection of conditions presenting as a problem in malabsorption: (by anatomic site)

1. Stomach
   a. Pernicious anemia
   b. Post surgery
      (1) Gastrectomy (especially Billroth II procedure)
      (2) Pyloroplasty
      (3) Vagotomy
2. Hepatobiliary
   a. Cholestasis
      (1) Intrahepatic
      (2) Extrahepatic
3. Pancreatic disease:
   a. Fibro-cystic disease
   b. Chronic pancreatitis
   c. Carcinoma of the pancreas or ampulla of Vater
   d. Post-pancreatectomy state
   e. Starvation (decrease pancreatic digestive enzyme formation)
   f. Zollinger-Ellison syndrome (diarrhea more characteristic than steatorrhea)
4. Small intestine:
   a. Sprue constellation: (? intestinal mucosal peptidase deficiency)
      (1) Tropical sprue
      (2) Non-tropical spure
      (3) Celiac disease
   b. Diverticulum or blind pouch
   c. Whipple's disease (intestinal lipodystrophy)
   d. Fistula

e. Resection of small bowel (usually only if greater than 50% removed)
f. Enteritis
   (1) Regional enteritis
   (2) Tuberculosis
   (3) Diffuse malignancy such as superficial spreading carcinoma of the stomach
   (4) Diffuse lymphoma
   (5) Scleroderma
   (6) Amyloidosis
   (7) Congestive right heart failure (edema of the intestinal mucosa, sub-mucosa and pancreas decreases local metabolism)
   (8) Starvation with protein deprivation (intestinal mucosal atrophy)
   (9) Drug injury (local effect due to prolonged exposure to such agents as Neomycin)
   (10) Congenital absence of sugar transport enzymes
   (11) Acute bacterial and viral infections
   (12) Giardia lamblia infestation
   (13) Diphyllobothrium latum infestation
   (14) Hookworm infestation
   (15) Acanthrocytosis (a-beta-lipoproteinemia); this causes the inability to form chylomicra for the transport of absorbed lipid from the intestinal mucosa
   (16) Menetrier's disease (Giant hypertrophy of the gastric mucosa)
   (17) Small bowel diverticulosis
   (18) Radiation enteritis
   (19) Diabetes - this may be associated with increased intestinal motility due to autonomic dysfunction
   (20) Superior mesenteric artery insufficiency

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Renal Failure and the Artificial Kidney

B. G. Clarke M D,* Associate Professor of Urology, Tufts University School of Medicine and J. Hartwell Harrison M D,** Clinical Professor of Genito-Urinary Surgery, Harvard Medical School. Reprinted by permission of the authors from "Diseases of the Urinary and Genital Organs" (A Review and Bibliography) - pps 130-135, Boston, Mass., 1960.***

During the past fifteen years great advances have been made in the management of renal failure both acute and chronic. Better understanding of the pathologic physiology and accompanying biochemical and metabolic disturbances of the uremic states has led to improved treatment of electrolyte and water imbalance by conservative medical means. Additional effective therapy has been gained by various forms of dialysis both intracorporeal and extracorporeal. External dialysis was first performed experimentally by Rowntree,

Abel, and Turner in 1913 using collodion as a membrane and hirudin as an anti-coagulant. In 1944 Kolff successfully carried out external hemodialysis in the human for the first time. This was now possible because of availability of cellophane as a dialyzing membrane and of heparin as an anti-coagulant. Walter in 1948 designed an improved modification of Kolff dialyzer and this was put to excellent experimental and clinical use by Merrill and associates at the Peter Bent Brigham Hospital in the study and treatment of severe renal failure. The following table from Merrill compares cellophane with the glomerular capillary.

	Cellophane	Total Human Glomerular Capillaries
Fractional Pore Area	30 - 35%	1%
Total Area	22,000 Gm^2	7600-15000 Gm^2
Pore Radius	30 Angstrom	30-45 Angstrom
Pore Length	80 M	1 M

Changes effected during a six hour dialysis employing the Kolff rotating type of artificial kidney with a blood flow of 200 cc per minute are shown below from Merrill.

Blood	0 Hr.	6 Hr.	Initial Composition of Bath
Urea (mg%)	360	112	0
Uric acid (mg%)	14	6	0
Creatinine (mg%)	12	2.7	0
CO_2 mm/h	12	20	27 mm/h
Na mEq/h	120	138	140 mEq/h
K mEq/h	6.8	4	4 mEq/h
Hematocrit	32	32	E

Multiple efforts at improvement of the artificial kidney have been made by Kolff, Alwall, Murray, Skeggs and Leonards, Murphy and Rosenack. The use of this complex apparatus has been largely developed by effective teams working in the larger medical centers throughout the world and their contributions to the general care of renal failure have extended far beyond the use of the artificial kidney alone. Other methods of dialysis that have been studied are peritoneal lavage, replacement transfusions, intestinal lavage and isolation of a jejunal loop for intermittent lavage.

In the absence of an obstructive lesion causing anuria, the electrolyte imbalance of acute renal failure is treated by restriction of fluids;hypertonic dextrose, insulin and sorbitol for K intoxication. Chronic acidosis requires careful administration of sodium and calcium especially when congestive failure has demanded digitalization. When anuria persists and conservative measures fail to control electrolyte imbalance, especially potassium intoxication, then

external dialysis is used to accomplish the selective removal of electrolytes and metabolites in a period of several hours. Restoration of normal acid-base balance and correction of K intoxication occur rapidly. Improvement of the chronic uremic patient from a state of torpor to alert consciousness has been impressive. The artificial kidney has been useful in the treatment of severe acute glomerulonephritis as a life saving measure until natural renal recovery has occurred;it has been especially valuable in the treatment of acute tubular nephropathy following major surgery, mismatched transfusion and hemolytic postpartum crises. The profound hypotension at times complicating biliary surgery and hepatic failure has been successfully combated by external dialysis. The preparation of patients having chronic renal failure for necessary surgery such as removal of neoplasms or transplantation of the kidney itself has been accomplished by external dialysis pre-operatively and further security obtained in the post-operative period by further hemodialysis when necessary. The availability of an experienced team and the artificial kidney has permitted the performance of desirable elective surgery on patients having chronic renal insufficiency that would not have been safe or justifiable without this security in the post-operative period.

An extensive program in the study of the homologous transplantation of the human kidney has developed from the studies by the team at the Brigham Hospital devoting their efforts to renal failure.

The Treatment of Renal Failure. Merrill, J. P. : Grune & Stratton. New York, London. 1955.

The Place of the Artificial Kidney in Research and Treatment. Harrison, J. H. : J Urol 70: 559-567, October 1953.

Peritoneal Dialysis. 1. Technique and Applications. Maxwell, M. H. ; Rockney, R. E. ; Kleeman, C. R. ; and Twiss, M. R. : JAMA 170: 917-924, June 20, 1959.

Acute Renal Failure. Franklin, S. S. ; and Merrill, J. P. : New England J Med 262: 711-718, 761-767, April 7 & 14, 1960.

Renal Transplantation

Historical. Nephritis with irreversible renal failure, or accidental loss of all functioning kidney tissue are the indications for kidney replacement by transplantation. Autografted kidneys, transplanted from one to another location in the same animals, survive indefinitely and function normally, as far as may be determined by any available test. Successful permanent homotransplantation of kidneys in animals and man had not been accomplished until 1954. Previous attempts at homografting had been technically successful and the kidneys had resumed function;but anuria had always developed within a few days or weeks. The principal pathologic change, presumably due to an immune reaction, was lymphocytic infiltration of the transplanted kidney and eventual failure of function.

Corneal homotransplants had been successfully practiced for some time. Homografting of skin between identical twins had been accomplished by Brown in 1937. Between antigenically dissimilar twins, however, rejection of kidney and skin transplants had been the rule. In 1954, homotransplantation of the kidney was successfully accomplished at the Peter Bent Brigham Hospital between identical twins who had undergone successful preliminary skin exchange grafts. The recipient, a young man who was in the terminal stage of glomerulonephritis, had been prepared for surgery with the use of the artificial kidney.

Clinical Considerations. Twelve (12) pairs of identical twins have, at the time of writing, undergone renal homotransplantation for advanced renal failure due to nephritis. The vessels of the donor kidney were anastomosed to the hypogastric vessels of the recipient, and the ureter to the bladder. Eleven of the 12 patients had return of their renal function to normal by all available tests and the longest survival until the present has been 4 1/2 years. One transplant was a technical failure. Although in each case the two original, diseased kidneys were surgically removed after recovery from the grafting operation, one patient died 4 months after transplantation because the transplanted kidney became involved with the patient's original glomerulonephritis. One of the patients successfully completed a pregnancy.

The General Problem of Renal Transplantation. The wider applicability of renal transplantation as a therapeutic technic in kidney disease awaits clearer understanding of the antigen-antibody mechanism. Experimentally, attempts are being made to modify the antigenic reaction of donated tissue, and to eliminate antibodies in the host. Total body irridiation has been utilized in the attempt to eliminate the antibody reaction of the recipient. Desensitization technics are undergoing study. The solution to the problem of tissue transplantation, however, seems to lie in the destruction of some essential element of individual specificity which, however, has not yet been accomplished.

Successful Homotransplantation of the Human Kidney Between Identical Twins. Merrill, J. P.; Murray, J. E.; Harrison, J. H.; and Guild, W. F.: JAMA 160: 277-282, January 28, 1956.

Kidney Transplantation Between Seven Pairs of Identical Twins. Murray, J. F.: Merrill, J. P.; and Harrison, J. H.: Ann Surg 148: 343-359, 1959.

Plastic Surgery: Tissue and Organ Homotransplantation. Cannon, B.; and Murray, J. E.: New England J Med 255: 900-904, November 8, 1956.

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Results of Nephrectomy in Hypertensive Patients. Thompson, G. J.: J Urol 77: 358-363, March 1957

The Cure of Hypertension by Nephrectomy. A Ten Year Follow-Up of a Case. Burkland, C. E. ;Goodwin, W. E. ; and Leadbetter, W. F. : Surgery 29: 67-70, July 1950.

Thromboendarterectomy for Hypertension Due to Renal Artery Occlusion: Freeman, N. E. ; Leeds, F. H. ; Elliott, W. G. ; and Roland, S. I. : JAMA 156: 1077-1079, November 13, 1954.

Renal Hypertension. Dustan, H. P. ;Page, I. H. ; and Poutasse, E. F. : New England J Med 261: 647-653, September 24, 1959.

The Kidneys in Surgery of the Abdominal Aorta. Szilagyi, D. E. ; Smith, R. F. ; and Whitcomb, J. G. : AMA Arch Surg 79: 252-265, August 1959.

Bilateral Stenosis of Renal Arteries and Hypertension. Treatment by Arterial Homografts. Poutasse, E. F. ; Humphries, A. W. ; McCormack, L. J. ; and Corcoran, A. C. : JAMA 161: 419-423, June 2, 1956.

Severe Hypertension Due to Congenital Stenosis of Artery to Solitary Kidney: Correction by Splenorenal Arterial Anastomosis. DeCamp, P. T. ; Snyder, C. H. ; and Bost, R. B. : AMA Arch Surg 75: 1023-1026, December 1957.

The above list is concluded from the Medical News Letter 44(3): 13, 1964.

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* Doctor Clarke's current address is 1224 Jefferson Bldg., Peoria, Illinois 61602. He holds the rank of Commander in the Medical Corps of the Ready Reserve and is engaged in the private practice of Urology. He served as a medical officer on active duty with the Navy during World War II and the Korean Conflict. We are indebted to both authors for this opportunity to republish their material.

** Doctor Harrison holds the rank of Lt. Col. MC AUS, Retired.

*** Doctors Clarke and Harrison had a thousand copies of this publication made and distributed to students and house officers at Harvard and Tufts. The supply is now exhausted. Through special permission of the authors, it is planned to republish in future issues of the Medical News Letter, selected papers from this excellent 137-page document. —Editor

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The Orthopaedic Management of Rheumatoid Arthritis

LCDR Richard B. Gresham MC USN* and LCDR Benjamin J. Gilson MC USN**. Proceedings of the Monthly Staff Conferences of the U. S. Naval Hospital, NNMC, Bethesda, Md., 1963-1964.

Since the advent of the polio vaccine the orthopaedist has had more time to consider difficult diseases such as congenital musculo-skeletal defects and the deformities of the collagen diseases.

Once the diagnosis of rheumatoid arthritis has been established, the patient should immediately be referred to the orthopaedic surgeon so that

instruction may be given in the prevention of joint deformities. This is especially true for the patient who is seen in the acute stages. It is during this period that the deformities rapidly develop and, if not controlled, progress to a fixed condition not amenable to conservative management. The pathology producing the deformities requiring orthopaedic treatment is basically the same in all joints. The inflammatory process, characterized by chronic inflammatory cells, is most prominent in the synovial membrane and as a pannus invading articular cartilage and subchondral bone.

It is this primary inflammatory pathosis that is responsible for the skeleto-muscular deformities which are seen in rheumatoid arthritis. The synovitis produces the boggy joints, laxity of the capsule, pain and flexion contracture. The contracture is initially a reversible phenomenon due to the massive proliferation of the synovial membrane which acts as a space occupying lesion, thus limiting motion. There is a secondary muscular splinting of the joint because of pain, the joint assuming the position of least discomfort. A third factor in the production of joint contractures is the inflammatory involvement of the muscles resulting in a spastic type of contracture which will ultimately become permanent as the muscles degenerate in their pathological position.

Once joints become immobile, the inflammatory pannus can destroy the articular cartilage from two directions, directly over the surface and by means of the subchondral invasion. The destruction of the cartilaginous portion of the joint can result in an osseo-ankylosis of the articulating bones. In some cases there is a bony hypertrophy rather than bone destruction. This is most marked about the knee and hip.

Conservative Management. The conservative management may be divided into three major areas:

1. Chemical control of discomfort with drugs.
2. Mechanical control of joint contractures with functional splinting.
3. Active control of joint function with physical therapy.

During the acute phase of the disease the severe contractures from the inflammatory process are reversible. During this stage, the involved joints must be splinted in functional positions. The splints will have to be removed at least once daily to apply physical therapy techniques to maintain both active and passive motion. It is only during these severe acute attacks that systemic steroids may have to be used for short periods of time to maintain joint function. As the patient's condition improves and contractions are overcome, splints have to be changed to meet the new condition. If the disease primarily involves just one joint it may be controlled to some degree with the use of local steroids injected intra-articularly. This procedure may be repeated several times, but overuse can result in neurotrophic-like changes in the joint. The early surgical removal of the synovial membrane in involved tendons and some joints such as the knee and metacarpophalangeal joints of the fingers may be considered a conservative measure compared to the drastic procedures which must be performed in the late stages of the disease.

The large number of drugs available to relieve the discomfort of arthritic diseases permits flexibility in meeting individual needs. The development of the steroids as a therapeutic agent seemed to be a solution to the discomforts of arthritis; however, time has shown that the systemic use of these drugs does not significantly alter the course of the disease process. Their use requires progressively larger doses and often leads to side effects which make the chronic reconstruction phase of the disease much more difficult. Most notable among the adverse effects of systemic steroids may be a "chemical adrenalectomy," which increases surgical risk and osteoporosis. This increases susceptibility to fractures and makes surgery involving osteosynthetic reconstruction more difficult. The longer patients remain on the systemic steroids the more vexing it becomes to withdraw the drug. In some instances the mental depression associated with withdrawal renders such measures impossible. To prevent these problems, systemic steroids should either not be used at all, or used only as a last resort for short periods not exceeding two or three weeks.

Hand. Direct involvement of the intrinsic musculature of the hand adds to the joint pathology to create progressive deformity and relative imbalance of action with the extrinsic tendons. There is gradual ulnar drift of the fingers with shortening of the lateral bands. Angulation and subluxation of the metacarpophalangeal joints permit further displacement of extensor tendons, which frequently come to lie within the gutters between the metacarpal heads. This may progress to complete dislocation of the joint. Relative over-pull of the intrinsics may result in the "intrinsic plus" deformity, with flexion of the distal interphalangeal joint and hyperextension of the proximal interphalangeal joint.

Recent emphasis on surgical treatment of rheumatoid arthritis has stressed the benefits attainable in the hand. Chemical and surgical synovectomies and repositioning of subluxed tendons will significantly increase function, as will surgical release of contracted lateral bands. Late changes may require arthroplasties of these joints. Selected fusions of the interphalangeal joint or metacarpo-phalangeal joint of the thumb may serve to recover tactile opposition. The weak first dorsal interosseous muscle may gain supplemental power by extensor indicis proprius transfer. Prosthetic replacement of joints may have merit particularly in the metarcarpo-phalangeal area.

Hip. The primary process of synovitis and joint destruction is accelerated in the heavy weight-bearing joints of the body such as the hip and knee. The painful hip assumes a position of flexion and external rotation. Once this process has resulted in joint destruction and fixed contractures, major reconstructive surgery is all that is available to the patient. In most cases this is some type of arthroplasty. The more common type is that of a metallic cup arthroplasty in which the joint is cleaned of its synovial membrane and articular cartilage on both the acetabular and femoral sides. The cup is fitted to the femoral head and acts as an interposing movable partition in the joint. The results are less than perfect and relief of discomfort is relative, but some degree of weight-bearing motion is preserved.

Stem types of prosthetics have been used to replace the femoral head in rheumatoid arthritis, but with less success than the cups. The poor quality of bone in these patients works against tolerance of the stem prosthesis, in that it tends to migrate in the acetabulum or work loose in the femoral shaft.

Knee. The synovitis which involves the knee results in weakened quadriceps, flexion contractures and joint destruction. Occasionally the hypertrophic type of the disease will produce great thickening of the patella. The disuse associated with this process results in atrophy of the quadriceps muscle. This is probably enhanced by primary muscle involvement with the inflammatory infiltrate. Once the chronic synovitis has developed, surgical excision of this source of inflammatory pannus may delay the destructive course of the disease. If flexion contractures have developed, surgical capsulectomy may be necessary to restore extension. When advanced joint destruction has occurred, arthroplasty may be performed, using some type of synthetic or biological interposing membrane, such as nylon or fascia. The synovectomy is performed at the time of this procedure. These arthroplasties do not restore normal joint motion; they offer only relative relief of pain.

Ankle. When the same destructive process involves the ankle, there is no surgery worthwhile. The ultimate result being dependent upon the effectiveness of conservative measures to maintain a functional weight-bearing position.

Foot. The arthritic involvement of the foot results in two major areas of deformities: the subtalar joint, and the digits. The affliction of the subtalar joint may produce a severe varus or valgus of the hind foot, which will require surgical correction and arthrodesis of the joint in a functional position.

Involvement of the metatarsophalangeal joints and the toes is similar to the process as seen in the hand. However, because the fine movement of the toes is not necessary for walking, the deformities, although severe, are not functionally as significant. Of great importance, is the painful metatarsal callouses and bunions which develop. The contractures of the MP joints and PIP joint forces the metatarsal heads down and the PIP joint dorsally resulting in the plantar callouses and painful dorsal corns. Reconstruction of the tendons in an attempt to balance these joints is of no benefit. The procedure of choice is resection of the metatarsal heads and most, or all, of the proximal phalanx of the toes. This relieves the pressure points and eliminates the painful joints. Function after this mutilating procedure is surprisingly good.

The orthopaedic management of rheumatoid arthritis consists of control of pain with salicylates and heat, control of joint deformities with splints, exercise programs, and excision of focal synovial membranes. Control of rheumatoid arthritis from its onset, through its ultimate destructive chronic stages should be of primary concern to the orthopaedist.

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* Acting Chief of Orthopedic Service, USNH, Bethesda, Md.
** Senior Resident in Orthopaedic Surgery, USNH, Bethesda, Md.

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MISCELLANY

RADM Eighmy Assumes New Duties in BuMed

Rear Admiral Herbert H. Eighmy MC USN, reported to the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., this week for duty as Assistant Chief for Personnel and Professional Operations. He reported to the Bureau from duty as Senior Medical Officer, U. S. Naval Academy, Annapolis, Md.

Admiral Eighmy attended Allegheny College and graduated with the degeee of Doctor of Medicine from Hahnemann Medical College in Philadelphia in 1933. He interned at Hahnemann Hospital in Philadelphia and in 1935-36 was Resident Anaesthetist and later Chief Resident Physician there. He was commissioned in the Medical Corps, U. S. Navy in July 1936 as a Lieutenant (jg) and progressed in rank to that of Rear Admiral, to date from 1 July 1964.

Rear Admiral H. H. Eighmy
Official U. S. Navy photograph. U. S. Naval Academy, Annapolis, Md.

Among his many duty stations were the Naval Hospitals, Philadelphia, San Diego, Newport, R. I., St. Albans, Great Lakes, Camp Pendleton, and Pensacola;* and duty aboard the following ships: USS RUSSEL, USS RAPIDAN, USS CURTISS, USS BUNKER HILL, USS CORAL SEA, and USS NEW JERSEY. He has also had duty with the Naval Medical School, Bethesda, Md., and the Naval Training Center, Norfolk, Va. He attended the Naval School of Aviation Medicine, Pensacola, Fla., where he was designated a Flight Surgeon in July 1941 and was serving as a Flight Surgeon at the Naval Air Station, Quonset Point, R. I., at the outbreak of World War II. From November 1944 to April 1946 he was Flight Surgeon of the USS BUNKER HILL which, with her Air Groups, won the Presidential Unit Citation with Star for heroic service in the

(* Commanding Officer, U. S. Naval Hospital April 1960-July 1963)

Pacific from November 1943 until April 1945. He was personally awarded the Bronze Star Medal, with Combat "V" and the following citation:

"For meritorious achievement as Senior Medical Officer of the USS BUNKER HILL during operations against enemy Japanese forces in the vicinity of Okinawa on May 11, 1945. After his ship had been damaged by heavy enemy air attacks, CDR Eighmy set up emergency battle dressing stations to replace those destroyed, gave medical attention to numerous seriously wounded men and led rescue parties into areas of fire and explosions to insure that wounded men were being treated and evacuated. His professional skill, courage and devotion to duty were in keeping with the highest traditions of the United States Naval Service."

In addition to the Bronze Star Medal and the Presidential Unit Citation Ribbon with Star, Admiral Eighmy has the American Defense Service Medal with Star; the American Campaign Medal; Asiatic-Pacific Campaign Medal; World War II Victory Medal; National Defense Service Medal; Navy Occupation Service Medal, Asia Clasp; Korean Service Medal with one operation star; and the United Nations Service Medal. He also holds the Navy Expert Pistol Shot Medal.

Married to the former Maud Marie Leonard of Meadville, Penna., Doctor Eighmy has two children, Barbara Ellen and Herbert Henry Eighmy, Jr. His official residence is Philadelphia, Penna.

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Proper Completion of the Report of Medical Examination

The importance of properly completed reports of medical examination (Standard Forms 88, 89) must be continually stressed to all medical department personnel concerned. If the personnel responsible (Medical officers, MSC officers and enlisted hospital corpsmen) would insure that the forms are complete in accordance with existing regulations and/or supported by such additional medical information that may be necessary in order to arrive at a sound clinical decision regarding physical fitness, most mistakes would be detected and corrected prior to submission. Listed below are some of the common errors noted upon review in BUMED and are provided for information and guidance of all concerned:

a. Medical History. Failure to comment adequately on items of medical, personal, or family history related by applicant on SF 89.

b. The Psyche. Failure to evaluate pertinent history concerning maturity, emotional stability, and suitability for service. See MANMED art. 15-7.

c. Miscellaneous Considerations. Failure to obtain statement from personal physician concerning history of asthma.

History of asthma beyond age 12 reported as "NCD". See MANMED art. 15-8 (3) (f).

d. Endocrine Glands and Metabolism. Failure to obtain standard glucose tolerance test in the presence of diabetes mellitus in a parent, sibling, or more than one grandparent. See MANMED 15-9 (3) (g).
e. Color perception. Failure to conduct color perception tests and report the results of Farnsworth Lantern Test or pseudoisochromatic test plates properly. See MANMED art. 15-11.
f. Heart and Blood Vessels. Failure to obtain the values of pulse and blood pressure (sitting position) in the AM and PM for 3 to 5 days without prolonged rest or any sedation when abnormal values are obtained on current examination. See Encl: (1) to BUMEDINST. 6120.19.
g. Genitourinary System. Failure to evaluate finding or history of albuminuria. See MANMED 15-22 (1) (a).
h. The Extremities. Failure to evaluate major joint for strength, mobility, stability, and functional capacity when history of injury is present. See MANMED arts. 15-23 and 15-89A.
i. The Teeth. Failure to indicate whether orthodontic appliances are "fixed" or "removable" and failure to include statement about the presence and degree of facial deformity with the jaw in normal position in presence of malocclusion. See MANMED art. 15-25 (6) (c) (6) and (7).
j. The Nervous System. Failure to investigate history of syncope or loss of consciousness. See MANMED art. 15-24 (2) (f).
k. Visual acuity. Failure to conduct and record visual acuity examinations properly, i. e., failure to report corrected vision; failure to obtain statement of unaided visual acuity with and without refraction when vision does not fully correct; and failure to detect contact lenses. See MANMED arts. 15-10, 15-86 and 15-87.
l. Standard Form 89. Failure to complete all Items (19, 20, 21, signatures).

NOTE: In recent years a number of mechanically reproduced copies of Standard Forms 88 have been forwarded to the Bureau, apparently as "originals." Also certain activities have adopted the practice of preprinting clinical entries on these reports prior to actually conducting the examination. Such variations are not authorized by current regulations and for various legal and administrative reasons are not acceptable. See MANMED art. 16-37(2).
—Physical Qualifications and Medical Records Div., BuMed.

* * * * * *

Job Opportunities for Ex-Hospital Corpsmen. Civil Service positions at certain U. S. Naval Shipyard Dispensaries are available for personnel qualified as "Medical Radiology" and "Medical Technician." Applicants may apply to the appropriate Regional Office of the Civil Service Commission for detailed information. —Hospital Corps Division, BuMed.

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From: FEDERAL REGISTER, the National Archives of the United States 29(132): 9366, 8 July 1964.

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Changes in Army PG Courses

"Medical Aspects of Recovery from Thermonuclear Attack: Medical Management of Mass Casualties" has been cancelled.

"Current Trends in Army Social Work" has been changed to 7-11 December 1964. Both of these changes supersede the announcement in Medical News Letter 43(11), 5 June 1964. —Training Branch, Professional Div., BuMed.

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FROM THE NOTE BOOK

BUMED INSTRUCTION 6120. 13 C

Subj: Procurement of civilian physicians to conduct physical examinations for reservists not on active duty

Purpose. To provide certain guidelines for the examination of inactive reservists by civilian physicians and to delete the requirement that SFs 88 and 89 be submitted for Departmental review prior to final action in regard to enlistment of applicants in the Reserve program.

BUMED INSTRUCTION 6120. 13B is cancelled and superseded.

—Physical Qualifications and Medical Records Div., BuMed.

* * * * * *

Eighth Annual Seminar on the Prophylaxis of Streptococcal Infection

The subject Seminar, sponsored by the Armed Forces Epidemiological Board, will be held at the Medical Service School, Gunter Air Force Base, Alabama, 29-30 October 1964.

Only a limited number of officers can be authorized to attend the seminar on travel and per diem orders chargeable against Bureau of Medicine and Surgery funds. Eligible and interested officers who cannot be provided with travel orders to attend at Navy Expense may be issued Authorization Orders by their Commanding Officers following confirmation by this Bureau that space is available. Requests should be forwarded via chain of command, in accordance with BUMED INST. 1520. 8A. NOTE: The deadline date for receipt of requests in this Bureau is 2 September 1964.

—Training Branch, Professional Div., BUMED.

Biomedical Materials Exchange Center. Some of the tissues most currently in demand from the Center include:

1. Fresh frozen functioning ovarian tumors for in vitro incubations.
2. Functioning pheochromocytomas, fresh frozen for metabolic studies.
3. Freshly excised human thyroid tissue, normal and pathologic.
4. Serum from patients with Hashimoto's disease, or other forms of chronic thyroiditis with hypothyroidism.
5. Fabry's disease.
6. Papillary ependymoma.
7. Frozen Tumor tissue.
8. Amyloid tissue.

Please do not send the materials, but inform AFIP where they may be obtained. Letters should be addressed to the Director, Armed Forces Institute of Pathology, Washington, D. C., 20305, Attn: Biomedical Materials Exchange Center.

Naval Medical Research Reports

U. S. Naval Medical Research Institute, NNMC, Bethesda, Md.

1. Treatment of Experimental Frostbite with Low Molecular Weight Dextran: MR 005. 02-0020. 01 Report No. 1, March 1964.

U. S. Naval Hospital, Navy Prosthetic Research Laboratory, Oakland 14, Calif.

1. An Oral Gelatin-Xylose Test for Estimating Pancreatic Proteolytic Activity: MR 005. 12-1408. 4 Subtask 4, April 1964.
2. Hydroxyproline Excretion in Endocrine Disease: MR 005. 12-1408. 4 Subtask 4, April 1964.

U. S. Naval School of Aviation Medicine, Naval Aviation Medical Center, Pensacola, Fla.

1. The Validity of the Oculogravic Illusion As A Specific Indicator of Otolith Function: MR 005. 13-6001 Subtask 1 Report No. 67, February 1962.
2. The Relationship of Small Visual Acuity Defects to the Ability to Complete Flight Training and Perform in Operational Flying. A Ten-Year Progress Report: MR 005. 13-3001 Subtask 3 Report No. 2, April 1963.
3. The December 1962 Report of the RBE Committee to the ICRP and ICRU in its Implications for the Assessment of Proton Radiation Exposure in Space: MR 005. 13-1002 Subtask 1 Report No. 26, October 1963.
4. Exclusion of Angular Accelerations as the Principal Cause of Visual Illusions During Parabolic Flight Maneuvers: MR 005. 13-6001 Subtask 1 Report No. 85, October 1963.
5. Instrumentation for the Pensacola Centrifuge-Slow Rotation Room 1 Facility: MR 005. 13-6001 Subtask 1 Report No. 88, October 1963.
6. A Signal Conditioner and Electrode Technique for Nystagmus Measurements: MR 005. 13-6001 Subtask 1 Report No. 78, 1963.
7. Vestibular Habituation During Repetitive Complex Stimulation-A Study of Transfer Effects: MR 005. 13-6001 Subtask 1 Report No. 93, January 1964.
8. Significant Physiological Parameters of the Ballistocardiogram as Analyzed by a Mathematical Model: MR 005. 13-7004 Subtask 6 Report No. 11, January 1964.
9. Influence of Strong Magnetic Fields on the Electrocardiogram of Squirrel Monkeys (Saimiri Sciureus): MR 005. 12-9010 Subtask 1 Report No. 8, March 1964.
10. Use of Caloric Test in Evaluating the Effects of Gravity on Cupula Displacement: MR 005. 13-6001 Subtask 1 Report No. 94, April 1964.
11. Prognostic Value of the Cold Pressor Test and the Basal Blood Pressure, May 1964.

U. S. Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

1. Adaptation of Small Groups to Extreme Environments: MR 005. 12-2004 Subtask 1, April 1963.

San Diego, Calif. (cont'd)

2. Effective Individual Performance in Small Antarctic Stations: A Summary of Criterion Studies: MR 005. 12-2004 Subtask 1 Report No. 63-8, April 1963.
3. Paroxysmal Eeg Activity and Cognitive-Motor Peformance: MR 005. 12-2304 Subtask 1 Report No. 63-1, April 1963.
4. Biographical Indicators of Adaptation to Naval Service: MR 005. 12-2004 Subtask 1 Report No. 63-19, November 1963.
5. Personal History Correlates of Performance Among Military Personnel in Small Antarctic Stations: MR 005. 12-2004 Subtask 1 Report No. 63-20, November 1963.
6. Past Experience, Self Evaluation, and Present Adjustment: MR 005. 12-2004 Subtask 1 Report No. 63-21, December 1963.
7. Habituation of the Orienting Response in Alert and Drowsy Subjects: MR 005. 12-2304 Subtask 1 Report No. 63-17, December 1963.
8. Computers in Brain Research: MR 005. 12-2304 Report No. 64-2.
9. Value and Personality Differences Between Offenders and Non-offenders: MR 005. 12-2201 Subtask 1 Report No. 63-6.
10. The Problem of Enuresis in the Naval Service: MR 005. 12-2201 Subtask 1 Report No. 64-3, January 1964.
11. Alpha Blocking and Autonomic Responses in Neurological Patients: MR 005. 12-2304 Report No. 63-11, March 1964.
12. Personal History Correlates of Performance Among Civilian Personnel in Small Antarctic Stations: MR 005. 12-2004 Subtask 1 Report No. 64-4, April 1964.
13. Educational and Psychological Measurement: MR 005. 12-2201 Report No. 63-2, Spring 1964.

U. S. Naval Medical Research Unit No. 2, Taipei, Taiwan.

1. Notes on the Mollusks of Lan Yu, Taiwan: MR 005. 09-1601 Subtask 3 Report No. 21, June 1963.
2. Study of Wilson's Disease in Taiwan: Report No. 63-5, September 1963.
3. Gastrointestinal Physiology. Experimental Design Failure of an Oral Solution Comparable to Stool in Volume and Electrolyte Composition to Replace Stool Losses in Cholera Absorption of Oral Water in Cholera: MR 005. 09-1040. 1. 14, September 1963.
4. Haptoglobin Type Distribution Among Filipino Residents of the Manila Area: MR 005. 09-1601 Subtask 7 Report No. 5, September 1963.
5. Laboratory Infection with Louping-Ill Virus: A Case Study: MR 005. 09-1201. 2. 12, November 1963.
6. Classification of Trachoma Virus Strains by Protection of Mice from Toxic Death: MR 005. 09-1201. 12. 22, January 1964.
7. Intestinal Parasites in an Aborigine Village in Southeast Taiwan: January 1964.

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DENTAL SECTION

An Approach to Biologic Variation in Human Pulpal Studies*

Harold R. Stanley BS DDS MS** and Herbert Swerdlow BA DDS***
Bethesda, Maryland. J Pros Den 14(2): 365-371, March-April 1963.

Through the years dental researchers have come to appreciate that the problem of biologic variation has made interpretation of human pulpal responses to various experimental procedures very difficult. Several recent investigations have shown, however, that this difficulty can be greatly minimized by merely having sufficient numbers and balanced quantities of teeth in both the experimental and control categories. Within a given category one must determine not only the range of responses to an experimental procedure but the average reaction as well. Nevertheless, as in most histopathologic investigations final results are never precisely clear cut to be graded "black" or "white".

The feasibility of performing clinical research in dentistry is finally being realized. We, for example, have been fortunate at the National Institutes of Health in obtaining adequate numbers of teeth for pulp studies from patients at the Clinical Center, a clinical research institution.

Persons were sought who possessed several intact vital teeth (free from caries and restorations) which were to be extracted for prosthetic, periodontal, or orthodontic reasons,[1, 2, 5]. Such subjects would then be admitted to a series of clinical projects, in addition to the pulp studies, involving general anesthesia, wound healing, temporomandibular joint syndromes, and complete denture investigations. The subjects participating in these studies received the necessary

* This abstract was prepared by the authors of the original article. The information and the manner of presentation as written for the Journal of Prosthetic Dentistry were so outstanding that RADM F. M. KYES DC, USN, sought permission to reproduce the entire article in the U. S. Navy Medical News Letter. Since copyright laws prevented this, Doctors Harold R. Stanley and Herbert Swerdlow volunteered the preparation of this abstract. Their contribution is printed with grateful appreciation.

** U. S. Department of Health, Education and Welfare, U. S. Public Health Service, National Institutes of Health, National Institute of Dental Research, Oral Medicine and Surgery Branch.

*** U. S. Department of Health, Education and Welfare, U. S. Public Health Service, National Institutes of Health, Dental Department, Clinical Center.

dental treatment in return for their cooperation in the projects. In this way, we have been able to obtain over 2,000 selected intact human teeth for pulpal studies in the past 8 years.

Dentin Thickness. The most important single factor in determining pulpal response to a given stimulus is the remaining dentin thickness between the floor of the cavity preparation and the pulp chamber. This measurement differs from the depth of cavity preparation since the pulpal floor in deeper cavities on larger teeth may be farther from the pulp than smaller teeth with shallow cavities. Pulpal response becomes increasingly severe as the remaining dentin thickness decreases.

At the risk of being facetious, it might be said that the problem of biologic variation would be simplified if human teeth were like elephant tusks. If a Class V cavity could be prepared with a sloping pulpal floor with increasing depth and consequently decreasing remaining dentin thickness, ranging from 3.0 mm. to almost a pulpal exposure, we could greatly reduce the number of teeth needed for studying any one specific factor. By extracting such teeth at each of three critical time intervals (1 day, 10 days and 120 days), the initial response, the fullest development of the lesion, and its resolution could be observed.

Because human teeth are too small to permit adequate and controlled sloping of the cavity floor, it is necessary to obtain adequate numbers of specimens at specific postoperative time intervals in order to balance the experiment. The data accumulated from approximately 25 specimens within a given postoperative time interval will provide the range of remaining dentin thicknesses needed. This information is then sorted and combined.

The following schematic photographs are presented to illustrate the value of composite drawings for summarizing the data related to a specific experimental study. It should be emphasized that such drawings only give general insight in understanding the response to an experimental procedure. More exact and detailed information will be found in the respective references.

Effects of Coolants. No response is induced by preparing a Class V cavity at 6,000 to 20,000 r.p.m. when using a No. 37 diamond stone and an air-water spray and subsequently restoring it with zinc oxide and eugenol cement if 3.0 mm. of dentin remains (Fig. 1). At 2.0 mm., a response is initiated and this increases in intensity as the pulp is approached. No burn lesions were created, even when the pulp was almost exposed. Although a Grade IV (XXXX) response may occur at low speed and air-water spray, the possibility of development of a nonreversible intrapulpal abscess is very slight when an air-water spray is used during preparation. The lesions created with the use of an air-water spray, regardless of speed, are always confined to the regions related to the ends of the cut dentinal tubules.[1, 2]

At the low speeds it is irrelevant whether air-water spray or air alone is used in superficial cavities (Fig. 2). The potential for creating burn lesions becomes real only if the remaining dentin approaches a thickness of less than 1.5 mm. A resulting burn lesion can extend not only beyond the cut tubules but completely across the pulp chamber to the opposite surface of the tooth.

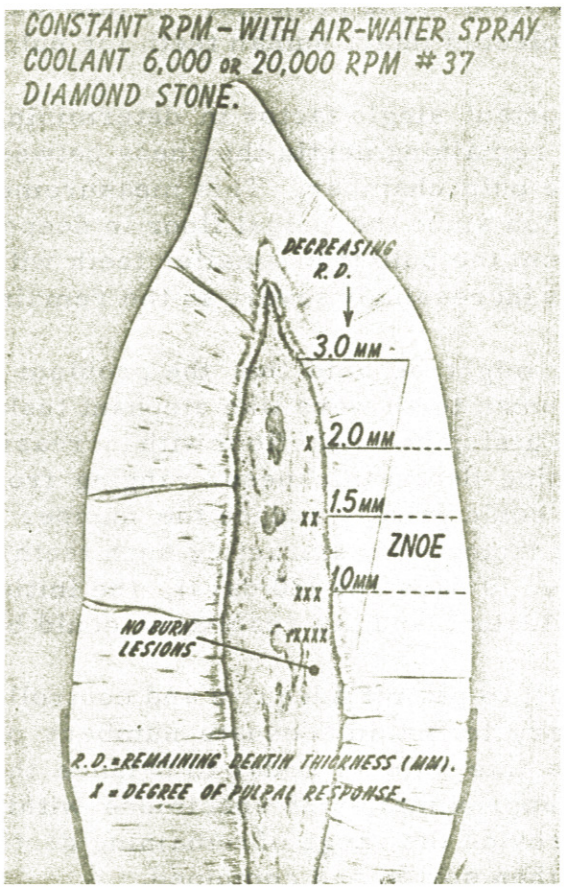

Fig. 1.

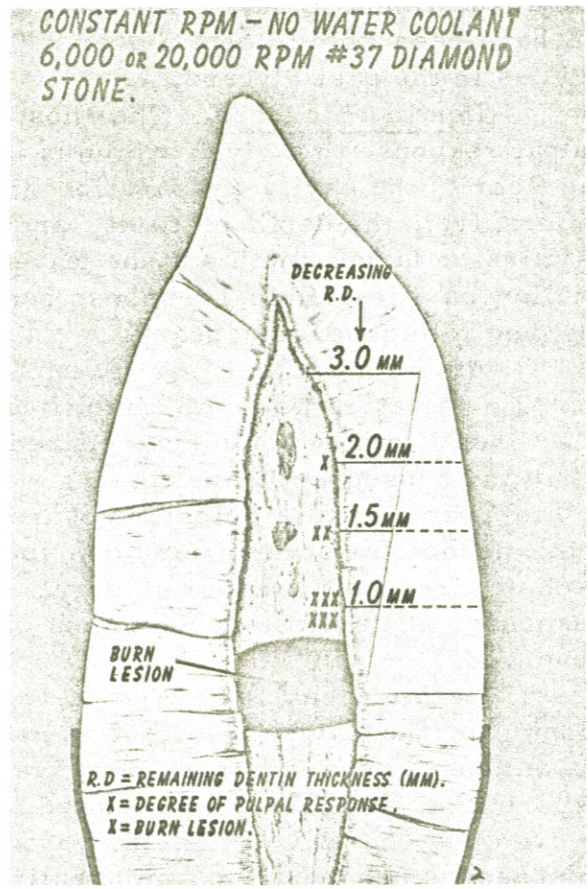

Fig. 2.

Fig. 1. ——The most critical factor in determining the degree of pulpal response is the thickness of the remaining dentin (R. D.) measured from the bottom of the cavity to the pulp. Given a constant cutting speed and technique, the intensity of the pulpal response increases as the R. D. decreases. No burn lesion will result at any cavity depth provided an adequate water coolant accompanies the procedure.

——Reproduced by permission of C. V. Mosby Co., St. Louis, Mo.

Fig. 2. ——Without the use of an adequate water coolant, larger cutting tools, such as a No. 37 diamond stone, will create typical burn lesions within the pulp when the remaining dentin thickness becomes less than 1. 5 mm.

——Reproduced by permission of C. V. Mosby Co., St. Louis, Mo.

About 23 per cent of all burn lesions become intrapulpal abscesses, the others being reversible with the formation of reparative dentin.[1] The percentage of reversibility would be less for cavity preparations in carious teeth which possess decreased pulpal resistance due to existing preoperative pathosis.

For those who continue to cut with no coolant or with air alone, no burn lesion will develop with a No. 35 carbide bur at operating speeds of 6,000 or

20,000 r.p.m. However, at the higher speeds, a No. 35 carbide bur will produce a burn lesion as readily as a dry diamond stone.

Rotational Speeds. In Figure 3, low speed techniques are compared with high speed techniques. At the same remaining dentin thickness, higher speed techniques will induce half the pulpal response of the more traumatic lower speeds. At 1.0 mm. of remaining dentin, the average intensity of the inflammatory response is only Grade I (X) as compared to Grade III (XXX) with the low speed technique.[1, 3, 4]

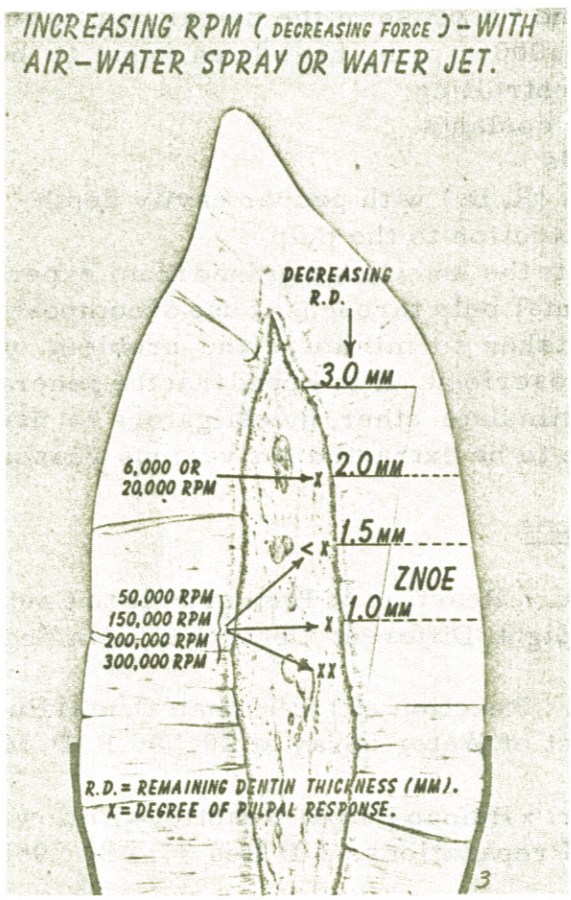

Fig. 3.

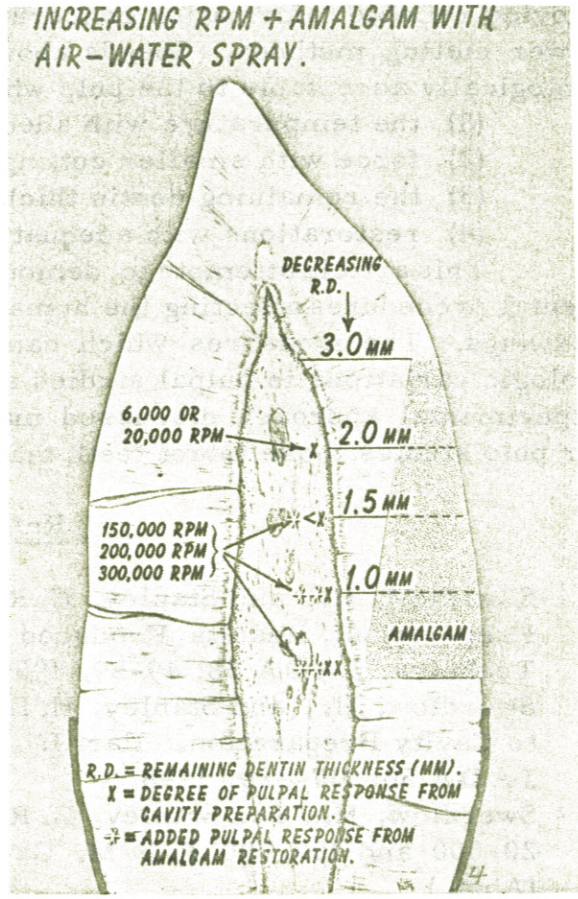

Fig. 4.

Fig. 3. ——Given adequate water coolants, the same cutting tools, and comparable remaining dentin thickness, the intensity of the pulpal response with the high speed techniques (decreasing force) is considerably less traumatic than the lower speed techniques (increasing force).

——Reproduced by permission of C. V. Mosby Co., St. Louis, Mo.

Fig. 4. ——The insertion and condensation of amalgam in unlined cavities prepared with high speed instruments enhances the pulpal response intensity in such a way that the combination of high speeds in cavity preparation and amalgam restoration condensation equals the response of low speed cavity preparation alone. Much of the biologic advantage of the high speed technique is nullified. ——Reproduced by permission of C. V. Mosby Co., St. Louis, Mo.

Amalgam Condensation. The biologic advantage of cutting tooth structure at high speed is sometimes reduced when followed by the insertion of certain filling materials. For example, in Figure 4, the pressures of amalgam condensation on virgin dentinal tubules unlined with reparative or secondary dentin intensified the pulpal response. The use of a cavity liner or base material capable of protecting and/or sealing the dentinal tubules not lined with reparative dentin is imperative prior to placing some restorative materials.[5]

Summary. Enough histopathologic studies have now been completed to provide reliable information concerning the response of the dental pulp to the newer cutting methods. Speeds above 50,000 r. p. m. have been found to be biologically acceptable to the pulp when controlling:

(1) the temperature with adequate coolants
(2) force with smaller cutting tools
(3) the remaining dentin thickness (R. D.) with proper cavity depth
(4) restorations with adequate protection to the pulp

This article attempts to demonstrate the knowledge gained from experimental procedures affecting the human dental pulp through the use of composite drawings. The measures which can be taken to minimize the problem of biologic variations in pulpal studies are described. It is hoped that the general experimental approach discussed may stimulate other investigators to use for pulp studies those intact teeth that are to be extracted for various reasons.

References

1. Swerdlow, H., and Stanley, H. R., Jr.: Reaction of Human Pulp to Cavity Preparation: Results Produced by Eight Different Operative Grinding Technics, J A D A 58: 49-59, 1959.
2. Swerdlow, H., and Stanley, H. R. Jr.: Reaction of the Human Dental Pulp to Cavity Preparation. Part I. Effect of Water Spray at 20,000 R. P. M., J A D A 56: 317-329, 1958.
3. Swerdlow, H., and Stanley, H. R., Jr.: Human Pulpal Reactions Following 20,000 and 150,000 R. P. M. Cavity Preparations, J D Res 37: 68, 1958. (Abst.)
4. Swerdlow, H., and Stanley, H. R. Jr.: Reaction of the Human Dental Pulp to Cavity Preparation. Part II. At 150,000 R. P. M. With Air-Water Spray, J Pros Den 9: 121-131, 1959.
5. Swerdlow, H., and Stanley, H. R., Jr.: Response of Human Dental Pulp to Amalgam Restorations, Oral Surg., Oral Med. & Oral Path. 15:499-508, 1962.

Progress in medical and dental research is developing at such a rapid rate that half of what physicians and dentists learn today will be obsolete in the next ten years. The information that is to replace the obsolete material is under investigation and is not yet known.

——Food and Nutrition News, January 1964.

Preventive Dentistry Training Aids

All dental activities are urged, in the development of their preventive dentistry educational programs, to use technical information and supplemental training aids provided by commercial firms and other dental institutions. To each dental department's professional judgment is delegated the authority to select material which will be most suitable.

There are numerous firms which have prepared such material, some of which has been approved by the American Dental Association. Information concerning the availability of this material may be obtained by writing to BuMed (Code 611).

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AVIATION MEDICINE DIVISION

Joint Committee on Aviation Pathology to Convene at AFIP

WASHINGTON, D. C., July 16, 1964 (AFIP)——Officials of the Armed Forces Institute of Pathology have announced plans for the Fifth Scientific Session of the Joint Committee on Aviation Pathology to be held at the Institute Oct. 12-14.

The Scientific Session, which will be held at AFIP on the grounds of the Walter Reed Army Medical Center in Washington, D. C., will cover a wide range of subjects involving aerospace pathology and aircraft accident investigations.

Papers will be presented by military and civilian speakers from the United States, United Kingdom and Canada. Planned sessions include: legal aspects of aircraft accidents; pathological problems associated with mass casualties; preventive medicine and aviation; aircraft accidents at sea; investigation of aircraft accidents under difficult geographic conditions; recent work in anoxia and decompression; and aerospace toxicology.

The Joint Committee on Aviation Pathology was established by the U. S. Department of Defense in 1955 as a central coordinating committee concerned with all matters relating to the role of pathology as applied to aviation and flight safety. Operating under the AFIP, the Committee serves as a focal point for the dissemination of information in those areas.

Membership of the Committee consists of two representatives each from the three United States military services, the Royal Air Force, the Royal Navy, the Royal Canadian Air Force and the AFIP. Headquarters for the Committee are located at the AFIP. Previous meetings have been held in all three of the participating nations.

Application for registration for the Scientific Session should be made to: The Secretary, Joint Committee on Aviation Pathology, Armed Forces Institute of Pathology, Washington, D. C. 20305. Early application is recommended as the number which can be accepted is limited.

———Submitted by - 1Lt. Melvin A. Mallory, Jr., USAF, MSC
Technical Liaison Officer
576-2901 (Code 198) Ext. 2901

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Determination of Fire Hazard in a Five Psia Oxygen Atmosphere at One and Zero Gravities

Arthur L. Hall* and Hwai S. Fang**

Many types of artificial atmospheres have been studied in an effort to determine the optimum one for use in a space cabin or high altitude gondola. Mixtures of oxygen and nitrogen or some other inert gas, pure oxygen at some specific altitude pressure, or even terrestrial atmosphere at sea level pressure or less must be considered. After the breathing mixtures which will sustain life adequately have been selected, it is essential that each be evaluated in terms of the possibility of hazardous external fire.

Previous experimentation in this respect has not been extensive. In studies of human subjects exposed to a simulated altitude of 34,000 feet (3.6 pounds per square inch) with a 100 per cent oxygen atmosphere, an increase in rate of burning of paper at this partial pressure was noted. No ill effects of exposures for up to five days were observed in the subjects.

Shternfeld stated that if, under conditions of weightlessness, a match is struck against the box, the head of the match will burst into flame, but the match will not ignite; no candle or gas will burn. He did not mention ambient gas mixtures. In his book, Soviet Space Science, the author wrote, "It should be noted that with a high amount of oxygen (in the cabin) the danger of fire increases, and food products rapidly oxidize and spoil; for this reason the microatmosphere must also contain a certain amount of other gases."

The Project Mercury capsule was designed to maintain an internal atmosphere pressure of 100 per cent oxygen at 5 pounds per square inch absolute (5 psia 0_2). This same atmosphere pressure was that of the Mercury full pressure suit, and plans for Apollo and Gemini include such a cabin atmosphere.

For this reason it appeared worthwhile to investigate this particular atmosphere for external oxidation hazards, and future studies will examine some of the other gas mixtures which seem to sustain life adequately. To test

* Ph. D., U. S. Naval School of Aviation Medicine, Pensacola, Florida.
** M. D., Department of Physiology, School of Medicine, National Taiwan University, Taiwan, China.

the validity of Shternfeld's statement that a candle will not burn under conditions of weightlessness, a series of 35 zero gravity parabolas of 25 to 28 seconds duration each were flown in a KC 135 airplane with a candle ignited in a test chamber. *

TESTS

Sea Level in Air. For control measurements, twenty standard ash-free paper strips were ignited, in sea level pressure in air, and ignition temperature as well as time in which one inch of the paper burned were recorded. Exposed to the heated elements for a maximum of fifteen seconds were: (1) four strips of the neoprene coated light weight nylon twill fabric, (2) six test strips of 3.25 ounce nylon, (3) six test strips of vinyl plastic, and (4) four strips of aluminum plate.

A 2-inch piece of standard burn paper ignited by the heating element was placed on the shaved portion of the body of an Albino rat which had been sacrificed with pentobarbital.

Toweling was dropped on top of an ignited paper burn strip as soon as the paper was aflame to determine the smothering properties of the toweling.

Five Pounds Per Square Inch Oxygen Pressure. The low pressure chamber was evacuated to between 40,000 and 60,000 feet of simulated altitude (2.7 to 1.04 psia) and flooded with oxygen until the simulated altitude was reduced to 26,000 feet (5.2 psia) and the oxygen tension was stabilized in the inside atmosphere between 4.8 and 4.9 psia.

Twenty paper test strips were ignited after being in the 4.8 to 4.9 psia oxygen atmosphere for periods varying between five minutes and seven hours. Exposed to the 1800° F heating elements after being in the oxygen atmosphere for various time periods were: (1) five strips of the neoprene coated nylon twill fabric, (2) eight of the 3.25 ounce nylon twill fabric, (3) eight vinyl plastic strips, and (4) four aluminum strips.

The body of one shave rat which had been sacrificed remained in the oxygen atmosphere for five minutes at which time a test paper placed in contact with its body was ignited. Another rat remained alive for six hours in the same oxygen atmosphere before being sacrificed and exposed to the fire in a similar manner.

After one hour in the oxygen atmosphere a test paper strip was ignited by the heating element. As soon as flame was observed, the towel smothering device was dropped into the fire.

RESULTS

In air at sea level pressure, paper burned, and nylon, neoprene, and

* Grateful acknowledgement is extended to the United States Air Force, Wright-Patterson Air Force Base, for the use of the KC 135 and for the help of numerous personnel.

vinyl plastic melted. Skin of an exposed rat was singed. In the 5 psia oxygen atmosphere paper ignited at a lower temperature and burned approximately six times as fast. The other materials also burned, including exposed rats which were burned over their entire body.

When the toweling was dropped on the paper test strip under sea level pressure in air, the fire was smothered in 0.25 second. In the oxygen atmosphere, however, the toweling burst into complete flame within one half second from the heat of the fire and thus did not make contact with the fire itself; furthermore, it burned completely and partially melted the copper positioning wires. Under these conditions no smothering action of the toweling was possible. The candle continued to burn during all exposures to weightless parabolas, either in air at sea level pressure atmosphere or in a 5 psia 0_2 atmosphere.

CONCLUSIONS

1. An artificial atmosphere of 100 per cent oxygen at an absolute pressure of 5 pounds per square inch presents a significant increase in fire hazard as compared with at an atmosphere of air at sea level pressure. This significant increase can be observed in the lowered ignition point and in the increased rate and temperature of burning.
2. It is infinitely more difficult to smother fire in such an atmosphere than one in a sea level pressure atmosphere.
3. A burning candle will not extinguish itself under conditions of weightlessness.

* * * * * *

Flight Physiology Notes

U. S. Naval Air Station, North Island, San Diego, California.

A fundamental requirement of flight is keeping the take-offs and landings in a one-to-one ratio, keeping the aircraft in a reasonably intact and functional unit during and after these evolutions. This rather factitious statement also implies that when accomplished the occupant variously called "fly boy", "airdale", "bird man", "jet jockey", etc., will also be returned in a reasonably intact functional unit.

Man acts as a system component in the man-machine relationship we call aviation. In aviation the Naval Aviator reacts to various inputs from the machine, as for example, artificial horizon, air speed indicator, warning lights, tail pipe temperature, engine R. P. M., manifold pressure, etc., as well as to intermittent voice inputs from the radio. He reacts to inputs from his cockpit and ambient environment such as vibration, engine sounds, clouds, rain, fog, lights, attitude, acceleration, and in addition he receives feedback to his muscles from the stick, rudder, and many other subtle input stimuli.

From these inputs he makes decisions to perform certain control movements. These movements affect the machine which in turn furnishes new and different inputs to the pilot. This is called a closed loop system because it requires continuous interaction between the man and machine. In essence man becomes a biologic sensor, data processor, decision maker and controller component, inserted between the displays and the controls of the aircraft. Man and the machine have different capabilities and limitations, and each may be more or less affected by the environmental area in which they operate. By and large, the aircraft is specifically engineered and designed to operate within certain known physical environmental parameters, whereas man has a fixed design and will only operate effectively within the physical environmental parameter imposed by this design. There does not seem to be a newly engineered and redesigned human in the offering within the foreseeable future; it is therefore vital that the parameters of the physical environment for the aviator be maintained within his design limits. We would like to provide protection against the wide range of physical environment in normal flight and the tremendously expanded parameters that could exist in any set of circumstances that may be encountered from the time of his aircraft entry to his exit, which of course may be prior to the completion of the flight. All of this involves the commonly known devices such as cabin pressure and air conditioning, oxygen masks, hard hat, anti-G suits, poopy suits, restraint systems; pressure suits, sun visors, gloves, flash blindness protection, wind blast protection, survival kits, ejection seats, parachutes, etc. There is not complete agreement that the presently available equipment nor perhaps the methods or concepts used to protect man in the system is perfect. Particularly in relation to comfort, there is however, general agreement that it is effective and the best available in relation to the state of the art as it exists today. Constant and continuing efforts are being made to increase the effectiveness and to improve the "acceptability quotient" of both the methods and the equipment that is so vital to the satisfactory mating of man and machine. Unfortunately the overall problem is further complicated by the fact that much of the time the Naval Aviator is not mated to his aircraft but is functioning in his normal environment, where he could and many times does impose severe stress on his biologic system. This becomes particularly important when one relates this to his role as an integral functioning part of the man-machine relationship of aviation.

Because the non-flight status of the Naval Aviator so vitally affects his in-flight performance, it behooves us to examine and to discuss what might be called "pilot preventive maintenance".

"We Are What We Eat"

This old adage now has a new handle called "diet and nutrition" and it is of particular importance to flight personnel. In his role as a bio-sensor, computer, and data processor the pilot requires better than ordinary management of fuel replenishment in order to cope with the demands

of flying. In addition the fuel intake should contain the proper proportions of fat, protein, carbohydrates, mineral and vitamins.

In considering preflight human fueling one must include all foods ingested for the 24 hour period prior to the flight, and not merely that food which is taken just prior to a flight. This is necessary because certain foods and drink, that are not compatible with optimum physical and mental efficiency, have effects lasting many hours. Ideally the preflight meal should be eaten under conditions which are relaxed and unhurried. Such a meal should be based on a daily calorie intake of from 3000 to 3600 calories depending on age, physical characteristics and length of time before the next meal.

Flying involves only moderate exercise; therefore, one should eat to fly the aircraft, not to carry it. Large meals tend to inhibit or slow down digestion, overload the excretory organs and circulatory system and dull mental faculties. Meals should be moderate in size, fairly bland, palatable, easily digested and satisfying. The following is taken from the Air Defense Command Surgeon's Bulletin:

"Total daily food intake should usually include items from all of the following food groups:

Leafy, green and yellow vegetables	-	One or more servings daily, some raw, some cooked
Citrus Fruits, tomatoes or salad greens	-	One or more servings daily
Other fruits, other vegetables and potatoes	-	Two or more servings daily
Milk and milk products	-	At least a pint of milk (for Adults) or equivalent in evaporated or dried milk, cheese, ice cream or in cooking
Meat, poultry, and fish	-	One or more servings daily
Peas and nuts	-	Two or more servings weekly
Eggs	-	Four or more per week; one or two daily preferred
Bread, flour, cereal (whole grain, enriched or restored	-	Two or more servings per day as needed
Butter or fortified margarine	-	One or two ounces per day
Other foods as needed for energy requirements		

The following are foods to be avoided:

a. Greasy foods and any others containing excessive amounts of fats
b. Highly concentrated carbohydrate foods (potatoes, bread, cake, candy, etc.)
c. Highly seasoned foods and condiments (including catsup, chili sauce, garlic, mustard, meat sauces, etc.)
d. Gas forming foods. Commonly considered to be "gas-forming are: Raw apples, melons, dried beans, peas and lentils, broccoli,

cauliflower, cucumbers, parsnips, rutabagos, radishes, turnips, onions, green peppers, garlic, cabbage, brussel sprouts, and sauerkraut. These high roughage foods should be avoided whenever possible during a period of about 24 to 48 hours prior to flight. This follows from the fact that food usually requires about this long to pass through the intestinal tract.

e. Foods high in roughage. Foods high in roughage which should be avoided in preflight meals are; bran products, celery and berries.

f. Carbonated beverages should be avoided for one or two hours before flying.

Skipping meals prior to flights can be as dangerous as overeating; this is especially true if the meal skipped is the morning meal. No one in their right mind would consider taking-off with practically no fuel on board, yet if you take a morning hop without an adequate breakfast, this is exactly what you are doing. The time from the evening meal to the morning meal is usually the longest period of time, (8-12 hours), in which no food has been consumed and if this important meal is missed, hypoglycemia results. Blood sugar is the basic source of energy to the body and when it is low you are more easily fatigued, have slower reaction time, are more irritable, weak and mentally sluggish.

"Eat to Live, but Don't Live to Eat!"

Alcohol and the Naval Aviator

Spiritus Frumenti, alias joy juice, booze, hootch, sneaky pete, alky, moonshine, torpedo juice, firewater, etc., is a much misunderstood beverage. Alcohol can be and is burned by the body and has some food value. Usually it is not consumed for its food value, but rather for the effect it produces on the higher brain centers. Most people think of it as a stimulant and "tuner-upper", whereas in reality it is a depressant and a relaxer of self-control and discrimination. In suitable doses it is found by many people to increase the enjoyment of congenial company and tolerance to the boors. As the dosage is increased everyone, including the boors, appear congenial and the imbiber becomes the boor. Alcohol differs from other sources of energy in that it can be absorbed directly from the stomach and, therefore, its effects are more rapidly experienced. The food value of alcohol is, however, limited because there is no storage mechanism and because of the inconvenient side effects such as diuresis, mental confusion and loss of muscular coordination. To make matters worse alcohol, like narcotics and such poisons as cyanide, interfere with the ability of the body's cells to use the oxygen available to them.

Did You Know?

1. 35.4 percent of the total general aviation FATAL accidents studied were positive for blood and/or tissue alcohol.

2. Almost one-half of the alcohol-positive group crashed within 18 minutes or less after takeoff.
3. The accepted legal limit of blood alcohol is 150 mg/ml and that flying skills are measurably decreased by ONE FOURTH THE AMOUNT necessary to produce a measurable decrease in automobile driving skills.
4. In the alcohol-positive group that crashed the average alcohol level was, on autopsy, found to be 145 mg/ml.

Flying when obviously drunk has never constituted a significant problem, but the problem is significant in flying when the blood alcohol content is still high enough to impair maximum effectiveness and/or when the pilot is suffering from hangover. It takes the average individual about 3-4 hours to burn one ounce of alcohol; therefore, if not more than three one-ounce alcoholic drinks are consumed it appears safe to fly 12 hours after the last drink. Many investigators recommend that the time period between drinking and flying be 24 hours. (See OPNAV INST. 3740. 7)

Intelligent understanding and MODERATION form the keynote of any discussion of food and drink. SEE YOU AT HAPPY HOUR!!!!!?

Examination Other Than the Annual Physical

Few people voluntarily seek medical examinations except when untoward symptoms develop to the stage that they become annoying, or normal functions are upset. The annual physical is mandatory and is designed to detect early or insidious evidence of disease processes. But in aviation this is not sufficient and it is suggested that the Squadron Flight Surgeon perform random unannounced physical examinations on his squadron pilots with the goal of detecting and preventing any condition that interferes with or causes a decrement of the pilot's effectiveness in his role as a Naval Aviator. In order for this to be effective there must be good rapport between the Flight Surgeon and the members of his squadron and the squadron members should be properly oriented toward the value of this examination. By orientation toward the examination we mean that the procedure must be fully explained, what the examination will include, what it can and cannot reveal. It should be stressed that detection of many disorders depends in a large part on the frankness and honesty of the examinee. Important to this program is whole hearted support by the Commanding Officer, and his willingness to accept, back up and follow the advice of the Flight Surgeon. If the Commanding Officer is told by his maintenance officer that a certain aircraft is down he admittedly will "get on" the maintenance office to get it up, but he won't fly the aircraft until it is in an up status. This same attitude should prevail where the flight surgeon reports that a pilot is down.

Air Division Aviation Medicine Unit

By F/L JA Firth, CD Aeromedical Reports 1964.

Although the RCAF has had an Air Division in Europe since 1953, it is only

since last year that it has had its own aviation medical facility. Up to that time we had been able to use the facilities at the USAF base at Wiesbaden, and we have been most grateful for being able to conduct our training there. Throughout the past few years, however, it was becoming increasingly evident that this arrangement, although meeting indoctrination and decompression requirements, was not giving direct support to the operational task of the division and would give even less as it became more specialized in the strike-reconnaissance role. In addition, the distance from the air division units to Wiesbaden meant that each person going there on a course was away from his unit for at least three days. With these and other considerations in mind a unit was planned at Zweibrucken and, after many setbacks, came into being in 1963. The planning and equipping of the unit were very largely the work of S/L WJC Stevenson, who was flight surgeon in the air division from 1959 to 1963, and F/L J Soutendam, who was stationed at Wiesbaden during the same period. It was unfortunate for these officers that their tour in Europe expired just at the time the new unit was completed, but all was in readiness for the new staff to take over their duties and run the first refresher indoctrination course on 29 Aug 63.

The Unit consists of one arm of an "H" type barrack block and contains a briefing room, Flight Surgeon's office and examining room, Aeromed Training Officer's office, orderly room, chamber room, investigation and recovery room, workshop, waiting room, and toilet facilities. The staff consists of the Air Division Flight Surgeon, the Aeromedical Training Officer, a Sgt and two Cpl BioTechs, and a typist.

Two types of formal High Altitude Indoctrination courses are presently offered: an eight hour course for experienced aircrew, and a 14 hour course for inexperienced aircrew, and in the first three months of operation fifty personnel had received these courses, which are oriented towards the T33. Special courses for CF104 aircrew are planned to start early in 1964 and are directed specifically at the role of this aircraft. The primary subjects will be: human performance limitations in respect to available time, vision at low level, disorientation, ejection procedures, physical and mental hygiene, personal equipment, and the summation of physiologic stresses with their implications concerning pilot error.

One of the major functions of the unit is to provide a central point for the aeromedical activity of the Air Division and provision has been made to attend to all problems relating to personal flying equipment, the medical investigation of individual aircrew problems, and the human engineering aspects of flight and ground safety. Very close liaison is maintained with all flight safety personnel, simulator personnel, and those concerned with accident investigation. In order to keep abreast of current problems and techniques the Flight Surgeon also performs the duties of the 3 Wing Flight Surgeon and is responsible for the medical care of the aircrew operating from 3 Wing.

Some of the many minor support functions might be briefly mentioned. It is anticipated that the unit personnel will eventually form the nucleus of an

Air Division search, rescue, and crash investigation unit and the necessary equipment towards this end is being assembled. An aeromedical reference library for the use of Air Division has been formed. The personnel are active in all aspects of ground safety, and economical methods of ensuring an effective hearing conservation programme are under study. The latter programme will probably be monitored from the unit. Liquid oxygen is a source of continuous concern and its quality control programme requires constant attention and coordination.

In short, the overall aim of the unit is to achieve maximum utilization of the aeromedical capability within the Air Division and to apply that capability to the support of the operational task of the Division.

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New Section

A Look at Our U. S. Naval Hospitals ——— Yokosuka*

By CAPT R. E. Faucett MC USN Chief of Medical Service

Intern Training. On 16 October 1951, a preliminary letter was sent from General Headquarters, Supreme Commander of Allied Powers to the Surgeons of the three branches of the Armed Forces in Japan in which possibilities for establishment of an observership for select Japanese medical students in the Armed Forces Hospitals was suggested. After considerable discussion at local and Washington levels, the Bureau of Medicine and Surgery of the U. S. Navy agreed to cooperate in establishing such a training program and directed the Commanding Officer, U. S. Naval Hospital, Yokosuka, to implement such a program.

Subsequently, in conjunction with the Public Health and Welfare, Medical Section, SCAP, and the Japanese Ministry of Health and Welfare, a program was prepared. Agreements were concluded regarding screening, examining (including physical) and final selection of candidates for intern training who were recommended by the Deans of medical schools through the Ministry of Health. Seven candidates were selected to start intern training on 1 May 1952 at the U. S. Naval Hospital, Yokosuka. This was the largest group at any of the Armed Forces hospitals in Japan; the U. S. Army and Air Force each had 4 interns at 11 participating hospitals. Six members of this class eventually completed the whole year of training. This was on a purely voluntary basis without pay with official designator "observer intern".

In 1953, there were no candidates. In 1954, Dr. Kenzo Yada, a recent graduate of Keio University School of Medicine, came to the U. S. Naval Hospital, Yokosuka, and requested permission to spend one year at his own expense in observership capacity. Although there was no formal program, Dr. Yada received excellent instruction from all staff members. The Japanese Ministry

* Continued from U. S. Navy Medical News Letter, Vol. 44, No. 3.

of Health later granted approval for his training and he thus became the 7th graduate from the training program.

On 22 July 1954, the Bureau of Medicine and Surgery officially approved the intern training program in the U. S. Naval Hospital, Yokosuka, with 4 billets. This was increased to 6 on 22 October 1956, from 5 to 8 on 22 November 1957, from 8 to 13 on 5 November 1958 and from 13 to 14 on 13 October 1959.

With the reassignment of intern billets in the Tri-Service hospitals, incident to the disestablishment of the 6022nd U. S. Air Force Hospital, Johnson Air Force Base, in November 1962, these 6 billets were temporarily assigned to the U. S. Air Force Hospital, Tachikawa. However, on 1 March 1963, U. S. Naval Hospital, Yokosuka, increased their billets from 14 to 16. Thus, since its inception in May 1952 to the present date, a total of 84 Japanese medical students have completed internship training at this hospital.

Prior to 1959, each candidate submitted his application through the Japanese Ministry of Health to the respective Armed Forces hospital of his choice for training. Each hospital intern committee, therefore, examined the candidates and selected the successful ones. In 1960, the Tri-Service Intern Committee, representing each of the 3 participating hospitals, conducted the professional and physical examination of all candidates on the same date with final selection made upon a matching system similar to that used in the United States. The total number of candidates appearing for the examination in 1960 was 67, 1961 was 76, 1962 was 106, and 1963 was 107.

The Tri-Service Internship is officially approved by the Japanese Ministry of Health. The interns have had a spectacular success in the National Board Examinations as well as the Educational Council for Foreign Medical Graduates Examinations. Many have been successful candidates for graduate training in the United States and Germany. Several have won Fulbright Scholarships. The training program is quite similar in extent and scope to that offered in hospitals approved for graduate training in the United States. Quarters are provided in each hospital. Basic pay as of 1 July 1963 was 22, 400 yen ($62. 22) a month. Laundry is provided. Meals are available at reasonable cost within each hospital. The interns are considered as staff members of each hospital and enjoy certain base privileges as a result of this status.

A total of 100 interns have now completed this training program. In response to an alumni letter sent last March 1964 (only 80 answered), we learned that many former interns went to the United States of American for further graduate training. At present, we know of 32 interns who are in the United States of America under graduate training programs.

Of our former interns, 14 have now returned to Japan and occupy prominent positions on the faculty of various medical schools and teaching institutions.

The great majority of graduates of the U. S. Naval Hospital Yokosuka, intern training program continue in postgraduate work in Japan especially in research projects, leading in four years to advanced degrees in medicine. This year, at the Fourth Far East Session of the American College of Physicians held at U. S. Naval Hospital, Yokosuka, Japan, five ex-interns from this hospital were either principal speakers or coauthors of papers accepted for presentation.

Official U. S. Navy Photograph, USNH Yokosuka, Japan

New Intern Class of 1964-65

(Left to Right)

Top Row: Dr. Aoki, Dr. Konishi, Dr. Ogawa, Dr. Arai, Dr. Yamamoto, Dr. Watanabe

Middle Row: Dr. Kobayashi, Dr. Tateishi, Dr. Shibata, Dr. Lee, Dr. Kanehira, Dr. Tashiro, Dr. Inoue

Bottom Row: Dr. Fuji, Capt Suitor (Executive Officer), Capt Davis (Commanding Officer), Capt Faucett (Chief of Medical Service), Dr. Yamaguchi, Dr. Matsui

In summary, since 1960-61, 58 interns have completed training, 56 took the examination for certification by the Educational Council for Foreign Medical Graduates; 40 have permanent certification; 12 have temporary; only 4 failed.

This program has always received the cooperative support from the U. S. Embassy, Tokyo, Japan. The Honorable John K. Emmerson, Deputy Chief of Mission, U. S. Embassy, Tokyo, Japan, delivered the commencement address to the 1962-63 and 1963-64 classes speaking in English and in Japanese. U. S. Naval Forces Japan has provided financial support for the intern reception held each year following graduation ceremonies in the Commissioned Officers' Club. Approximately 150 people regularly attend this function. Many representatives of the Japanese Self Defense Forces as well as distinguished educators join parents and friends in this gala and festive occasion.

At the moment there is countrywide interest in and enthusiasm for the

intern training program in Japan. One-year of intern training is a prerequisite for licensure. However, very few hospitals in Japan have an organized intern training program similar to that seen in the Tri-Service Hospitals or in the United States of America. To illustrate the fine quality of training available to outstanding Japanese medical students, and, in an attempt to create new interest and support in the intern training program in general, the Tri-Service Intern Training Program has been featured on three television shows (two describing the program at U. S. Naval Hospital, Yokosuka, and one at U. S. Air Force Hospital, Tachikawa). This has given the U. S. Naval Hospital, Yokosuka, great commendatory publicity, particularly for our participation in the President's People-to-People Program.

I hope that this brief resume will give some idea of the interest, support and enthusiasm we at Yokosuka have for this wonderful program. We consider it a Person-to-Person Program because we become so intimately concerned with the welfare of our medical confreres that we naturally become vitally aware of the problems, cultural aspects, mores, etc., of the Japanese. Through such direct and interested contact we communicate with and learn to live with one another. In effect, we live in God's admonition to serve as our Brother's keeper.

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RESERVE SECTION

Restrictions Concerning Special Active Duty for Training

Taken from BuPers ltr Pers Da/ek Serial: 894 dtd 29 Jul 64

1. In past years it has been possible to authorize tours of ACDUTRA in excess of 14 days, or second tours of ACDUTRA, in certain instances where direct support was thus provided for the accomplishment of the Naval Reserve mission.
2. While the need for such support is recognized, the fact that the Naval Reserve is operating at or close to its authorized drill-pay ceiling requires continuation of the restrictions imposed late in fiscal year 1964.
3. Accordingly, the following criteria are established until further notice:

a. Special ACDUTRA authorized by Bureau of Naval Personnel directive, or for a planned and budgeted program such as school or special tours (e. g. the Accelerated Program, the Medical Clinical Clerkship Program, ROC instructors, or Reserve Recruit School Staffs) continues in effect.

b. Authority will not be granted to issue orders for more than 14 days ACDUTRA with pay or for additional periods of ACDUTRA with pay in cases where authority is not extended as above.

4. Special ACDUTRA in support of Research Seminars, Mobilization Team and Telecommunications Exercises, planning conferences, advance or clean-up parties for Reserve Mobile Construction Battalion ACDUTRA, additional tours

of ACDUTRA in Classification or Instructors schools for Reserve Construction Battalion personnel, Reserve program conferences, and other special requests from individuals or activities are not authorized.

5. These restrictions will be reviewed later in the fiscal year, and relaxed if circumstances permit.

New Film Ready for Showing

A 17-minute motion picture, "M-Day", which describes a new concept for Naval Reserve mobilization procedures, is available for showings. It tells how the Navy keeps track of its inactive personnel through centralized records, and how they will be mobilized in the event of a national emergency. The Naval Reserve Manpower Center prepares and sends the new Navy mobilization order (Active Duty Order, NavPers 4035) to an order-issuing activity. The film uses as its example a Naval Reserve Training Center designated as a post-M-Day mobilization station. At this NRTC, before mobilization, active duty personnel are shown administering Category "A" pre-ordered Reservists' orders. The Naval Reserve Mobilization Team (Category "A" Reservists themselves), attached to this training center, maintain the Category "B" pre-selected Reservists' orders. The procedures for recalling and processing these Reservists upon mobilization are shown.

The film traces the administrative procedures involved in the recall of inactive personnel, from the preparation and delivery of an individual's order, to the point where he reports to his duty station or ship. Reserve activities may obtain the training film (MN-10020) through normal distribution channels. ——The Naval Reservist, NavPers 15653, July 1964.

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